FOR
NEW
LIFE

It begins somewhere in the Pacific Ocean, 12 months prior to the appearance of new life. A female steelhead, weighing 5-18 pounds, sleek and healthy from feeding on the rich ocean life, begins to produce the 2,500-4,000 eggs (roe) that she will carry back to the spawning grounds of her own origin.

She undertakes the 8-month journey with single-minded purpose—to reproduce, to lay her eggs and give new life. If she arrives at her chosen spawning grounds hundreds of miles inland, her mission—and her life cycle is nearly complete.

The gravity flow spring water that abounds in Hagerman is ideal for raising fish.

FOR NEW LIFE

Every step of the reproduction process is critical. The gravel stream bed she has selected, for example, must be clean with water flowing **through** it, not just over it. Her freshly laid eggs must have sufficient oxygen. With a few powerful strokes of her tail fin, she rakes the stream bed, preparing a shallow nest (redd) for her roe.

Once deposited in the redd she has just dug, the eggs must be fertilized by a male within 5-10 minutes. Longer delays mean the eggs will swell with water, preventing fertilization.

Even more critical is the life span of the sperm laid over the eggs by the male. Swimming at random, the sperm must contact an egg's tiny opening (micropyle) within 30-60 seconds or her eggs will not be fertilized.

But having done her part, she will cover the fertilized eggs with gravel for security during their incubation Under increasingly complex and difficult environmental conditions, fewer than 50 percent of the female steelhead's roe will be fertilized.

That same steelhead, if taken from the wild and handled under hatchery-controlled conditions, will yield a 95 percent fertility count—a real justification for the hatchery you are visiting today!

Unprotected eggs and sack-fry show their largest loss rate in the wild.

LIFE BEGINS

Whether in the wild or under hatchery conditions, the now-fertilized egg immediately begins dividing and developing. Depending on water temperature, cells can divide as often as every 20 minutes.

The egg next enters a 3-14 day "closed period." The embryo grows from a flat disc of cells to a recognizable body form. During this time, the egg and its new life are extremely fragile. Poor water flow, fungus growth, and predation all take a severe toll in the wild.

THE EYE-UP STAGE

At the nd of the closed period, the steelhead egg enters the "eyed" stage. Having completed the delicate process of forming the spine and central nervous system, the retinal pigment of the eye now becomes highly visible through the egg's shell.

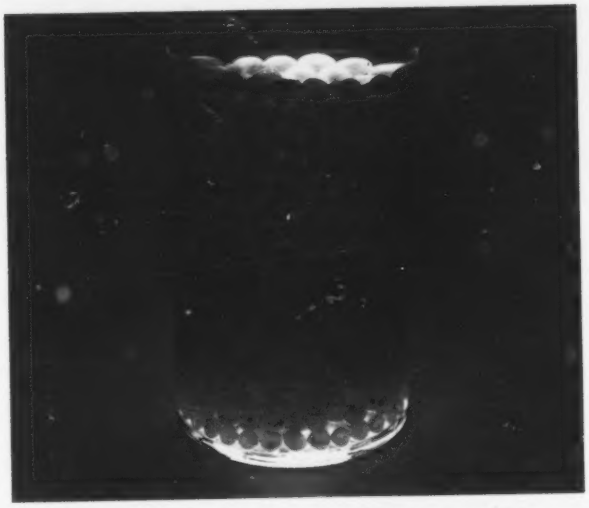
At this time, the egg becomes much more tolerable of rough handling. If necessary, hatcheries can ship eggs at this stage of development. Next the embryo, now 22 days after fertilization, releases an enzyme which softens the egg shell in preparation for hatching. The embryo finally breaks out of the shell, becoming what we call a sac fry.

Once free from the egg, the tiny steelhead lies helpless on the bottom, feeding off the highly nutritious protein and fat stored in its yolk sac. Its gills are active and the sac fry begins to respire—but it still can't swim.

At this stage the steelhead sustains its greatest losses in the wild—primarily due to predation and slow growth due to water temperatures. Under hatchery conditions, the delicate sac fry stage can be reduced from a month or so to 10-15 days. Predation is totally eliminated, resulting in greatly-increased rates of survival.

A percentage of previous years hatch are tagged for future count in the wild.

Hatchery conditions bring steelhead from sack-fry to smolt within a 12 month period.



Eggs being disinfected in iodine solution prior to being released to their hatching jars.

The retinal pigment is highly visible during eye-up stage. Highly visible in the photo above.

The orange sack of the fry holds some of the most nutritious protein known to man.

THE FRY— A TENUOUS BEGINNING

Emerging from its sac fry stage, the steelhead fry becomes a self-sufficient fresh water creature, capable of feeding and swimming. Still, the fry in the wild is literally swimming for its life.

Some two to three years after hatching, the small freshwater steelhead begins to undergo complex hormonal changes, in preparation for its migration to the ocean.

Two vital elements must be present. First, the steelhead's size must be right, ideally 7-8 inches. Equally important is an increasing day length, which is nature's signal telling him to stop resisting the river's current.

On this day, "smoltification" begins. The young fish change color from dark green to the light silver of adulthood as they await the next stage of their amazing life cycle.

If all the factors aren't right, they will remain fresh water fish for life, becoming resident trout. But if they are for-

tunate and nature cooperates, they will begin a 2-3 month journey downstream to the ocean. Continuing to undergo biological changes as they migrate, the young steelhead face the most difficult and dangerous period of their lives.

In the wild, growth to ideal size can take as long as three years before smoltification and migration begin. Under hatchery conditions, the growth and biological changes are accelerated, bringing the steelhead to smolt size in 12 months.

HAGERMAN NATIONAL FISH HATCHERY

These hatchery facilities began operation in 1933, with a capacity of 800,000 fish. In 1983, the U.S. Army Corps of Engineers rebuilt and expanded the facilities as a part of the Lower Snake River Compensation Plan—to offset losses caused by dams on the lower Snake River.

Since the constant 59-degree fresh water is gravity-fed to more than 60 rearing tanks and 102 raceways, the Hagerman National Fish Hatchery becomes one of the most cost-efficient mitigation hatcheries in the northwest. Fresh water flows through these rearing units at 25,000 gallons per minute.

The Hagerman National Fish Hatchery produces more than 1.5 million steelhead each year. The steelhead's life on the hatchery is completed each spring in April, when it is transported to Idaho's Salmon River drainage.

There it will be released to commence its arduous and hazardous journey to the Pacific Ocean. Hatchery loss over the past five years has averaged only 23 percent, as compared to an estimated 97 percent loss of fish in the wild.

With the increasing man-made and environmental pressures existing on America's wild rivers today, facilities such as this are becoming increasingly essential to the steelhead's very survival—operated by men dedicated to the preservation of a species, working to assist the struggle for new life.

Fisheries determine weight, length and populous count by fish count per pound.

Fish actually trip the "demand feeders" when hungry. This is an extremely cost effective feeding method.

Weekly water samples are checked for ammonia concentrations.

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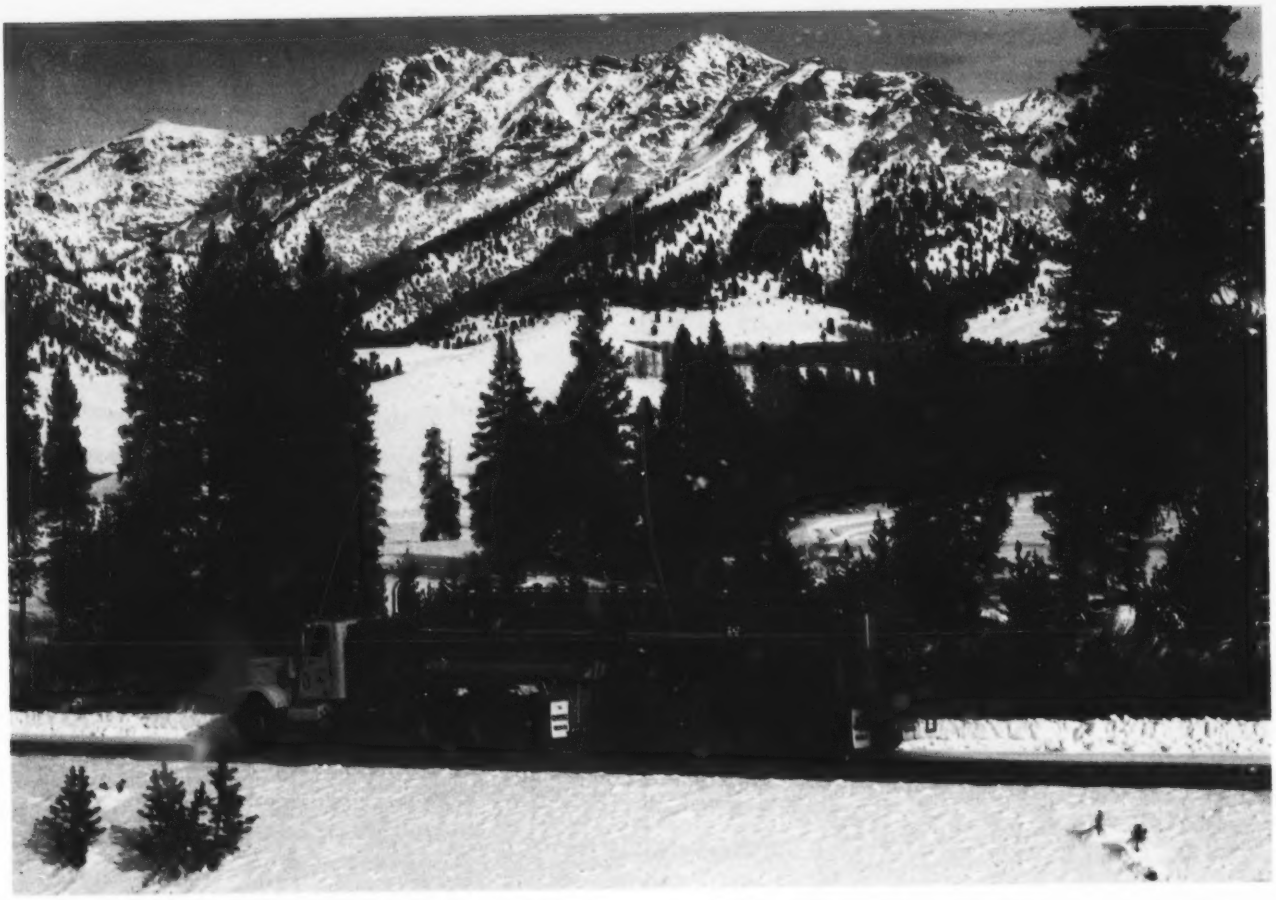

As man continues to change his environment, he must be willing to augment his efforts to replenish new life.

US Army Corps of Engineers
Walla Walla District

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

The following is a listing of facilities constructed by the U.S. Army Corps of Engineers for the Lower Snake River Fish & Wildlife Compensation Plan in Idaho.

STEELHEAD
Hagerman Nat'l
Fish Hatchery
Rural Rt. 1, Box 256
Hagerman, ID 83332
(208) 837-4896

SPRING CHINOOK SALMON
Dworshak Nat'l Fish
Hatchery
P.O. Box 18
Ahsahka, ID 83520
(208) 476-4591
(Near Orofino)

STEELHEAD
Magic Valley
Steelhead Hatchery
Idaho Dept. of Fish
& Game, Route 1
Filer, ID 83328
(208) 326-4201

SUMMER CHINOOK SALMON
McCall Fish Hatchery
Idaho Dept. of Fish
& Game, Box 1021
McCall, ID 83638
(208) 634-2690

SPRING CHINOOK SALMON
Sawtooth Fish Hatchery
Idaho Dept. of Fish
& Game,
HC64, Box 9905
Stanley, ID 83278
(208) 774-3684

Produced by Alfs & Associates - Design Steve Winegar